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GAS SERVICE AND LABOUR PROBLEMS

As a result of reduced gas pressures in the London area during recent cold spells, there has been a certain amount of grumbling in the National Press accompanied by an occasional outburst of petulance. In this regard it is salutary to reflect on the unfailing service rendered by the Gas Industry—and this applies to the country generally and not only to London—during the pre-war years in cold weather such as that of February, 1929, when the outputs of gas undertakings throughout the British Isles soared far beyond normal capacity, and when no single consumer suffered.

It is salutary, too, to turn to the difficulties of the war years and reflect how little the Gas Industry did, in fact, fail to serve the public. We are now faced with peacetime troubles without, we think, being graced with full vigour individually, and certainly as an industry the Gas Industry is suffering from labour emaciation. The Industry has every desire to preserve that goodwill which it built up with much effort during the pre-war years, and we think that it ought to be able to rely upon a certain amount of consumer tolerance in these difficult days. We write this note with gas pressures at normal, thanks to a rise in the thermometer; maybe there will be other cold spells this winter, and no doubt during the winters of succeeding years. But what did we do throughout several pre-war years, and what are we doing now about the provision of some measure of insulation in our homes? Even a small measure of insulation would result in a greatly decreased fuel consumption—gas, coke, electricity, coal, or oil—in the winter and a greatly increased standard of comfort during the summer. That is one root cause of the grumbles, and it is a root cause which the British do not seem anxious to eradicate.

There is unquestionably—and we have in mind what the Minister of Fuel said in the House of Commons last week in answer to a question as to how many service men and prisoners of war are now being employed in gas undertakings—a grave labour shortage of a permanent and skilful nature in the Industry. Last week Mr. Shinwell said that on January 15, 1,006 service men and 557 Italians were employed in the gas undertakings in Greater London, and he added that with the assistance of this emergency labour these undertakings had sufficient manpower to operate their available gas-making plant. He also said that they could not at present usefully employ more emergency labour. What we would question is the effectiveness of this mixed bag of emergency labour, and to what extent the Minister of Fuel and Power could have foreseen and made provision for such contingencies as have arisen in the Gas Industry to render its service quite frankly below par.

Tackled by another questioner, the Minister said that the Government could not force men back into gas-works, that it depended on their own volition, and meanwhile they were making the best of the situation. This idea of forcing men to come into the Gas Industry is to our mind of current importance. During the cold weather which we have experienced, there has on the news reels been a certain amount of publicity given to a single process of gas-making which has been out of all focus considering the methods actually employed by undertakings throughout the country. For example, of the gas made in this country, over 60% is made in plants which produce practically no visual sign of operation. Again, only recently we visited a works where, though the gas-making plant was not of the continuous vertical type, provision was made for the complete comfort of the operators, and where ventilation and lighting, air ducts to remove the rising heat from retort settings, and so on, were installed. Spacious platforming, efficient lighting, and excellent accommodation for dressing and washing, together with clothes-drying equipment and other post-war luxuries were included. At these works the men in their off time had the facilities of an excellent canteen, air conditioned. The cinema depicted quite different conditions of gas-making. For pictorial sake, and we hope for pictorial sake only, the usual flash was shown of grimy, hard-worked stokers facing flames and fumes. The atmosphere was one of smoke and the impression one of grime. Such news shots are unrepresentative of general gas-working conditions, but we cannot feel that they leave no mark on the picturegoer's mind. To what extent can we clarify this confusion of thought?

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TRAINING OF SERVICE PERSONNEL

DURING recent weeks we have in these columns discussed many aspects of the Heyworth Report on the Gas Industry, upon which the Government has as yet made no announcement as to its intentions to implement it or otherwise. There is, however, an aspect which we have by no means forgotten, and that is the training of personnel on the sales and service side of the Gas Industry, for, in spite of bottlenecks, we must look ahead to a more plentiful gas supply amid a competitive field. Long before the Heyworth Committee published its Report we had suggested that if training of service personnel should be done at all it ought to be done on a scale commensurate with the magnitude of a national industry, and as a corollary this demands adequate accommodation, extensive equipment, and competent instructors. It has seemed for some time to us that within limits the larger the scale of the training scheme the more economical it would prove.

The Heyworth Committee admits freely that the more progressive elements in the Industry have for long recognized the need for special training, and the Committee believes that the Industry, so far as its service personnel is concerned, is in normal times able to attract employees of the right type. After recruitment, however, there must be a period of training if the consumer is to be imbued with the belief that his particular undertaking desires to give him or her the best service available, and that he or she will be able to turn to the local undertaking for prompt help. Unfortunately, however, there exist so many anomalies in the Gas Industry. There are to-day, as formerly, no national standards and absence of common policy. In the words of the Heyworth Report, "some undertakings themselves give initial training to employees, and encourage in practical ways high standards of workmanship and service; the operation of such schemes, however, is not widespread, and is usually confined to the larger undertakings." What the Committee recommends is a chain of training centres distributed on a regional basis. We very much like the idea of a chain of regional centres provided that, in effect, the individual centres are not chained to the policy dictated by either an established London group or any other established Provincial group. We can achieve national standards through co-operation far more quickly, we feel, without dictation from any one particular centre, and in our opinion a national centre should have as its chief function that of a clearing-house of opinion and ideas—aiming towards unanimity throughout the country—rather than adopting any "take it or leave it" attitude.

Colliery Owners and Nationalization

In a letter last week to the Minister of Fuel and Power Mr. Robert Foot, Chairman of the Mining Association of Great Britain, set out the Association's views on the Coal Industry Nationalization Bill, and he divided the attitude taken to the various matters that arise under the Bill into three categories: first, those which are regarded closed; secondly, those of principle; and thirdly, those of procedure and detail.

In category 1 fall the principle of nationalization in the mining industry and the fact of arbitration, the composition of the Tribunal and the terms of reference. Turning to category 2, the Association feels that the Bill as it stands goes far beyond the proposal in the King's speech. It is felt that activities and business not part of the coal industry proper should be taken by compulsion only where they are so closely connected with the coal-mining operations that it is impracticable to separate them. Examples of separate activities are coke ovens, gas-works, patent or manufactured fuel plants, tar distilleries and chemical works, brick works, pipe works, and other similar organizations. A compulsory requisition, it is argued, would spread the principle of public ownership far into other realms of commercial activity.

Concerning methods of compensation, Mr. Foot makes it clear that the Association views with the gravest concern the principles in the Bill that "the payments are to be made in Government Stock, and that the nature and the amount of the Stock and the interest to be paid on it are to be settled by the Treasury at the time of issue without any right of appeal, however unfair any decision might appear to be; and that in all cases in which a Company is a colliery concern and does not go into liquidation the Stock can be and presumably will be made non-negotiable in the hands of its owners for an indefinite period (except for certain limited purposes). Owing to the Government's policy in regard to the fixing of the vesting date and the method of valuation, the properties to be compulsorily acquired cannot be paid for at the time of transfer. Indeed, in the best technical opinion, a period of not less than four years must elapse before the ultimate valuation of the mining assets can be completed."

The Association presses strongly for the insertion in the Bill of the usual statutory clauses "for the protection of the staff, not only of the individual colliery undertakings, but also of the collective organizations of the Industry. The provisions which we seek have a long line of Parliamentary precedents to support them, and it is a matter of great concern to us that the Government has not thought fit to include them in the Bill."

The letter concludes by saying that there are other questions which, while being of great importance, are matters of procedure and detail rather than of principle and policy, and the Association believes in this regard that it should be possible to reach agreement. It is in this belief that the Association reserves its suggestions.

Decline in Coal Output

Coal output figures continue to present an unhappy story. The average weekly output of coal from British mines in the five weeks ended Dec. 29 last was 3,276,600 tons; it was 3,593,700 tons in November and 3,424,600 tons in December, 1944. An estimated average weekly output of 3,653,800 tons is required in the six months November to April to secure the extra 8,000,000 tons called for by Mr. Shinwell, Minister of Fuel.

Output of mined coal in the five weeks to December 29 last, therefore, was 377,200 tons below the target level. Absenteeism among coalface workers for December was 20.40%, of which 10.81% was voluntary. In November the corresponding figures were 19.70 and 9.53, and in December, 1944, they were 17.61 and 7.93.

"Gas Service"

Thanks to a percentage increase in paper supplies our monthly *Gas Service* has heralded the New Year with what it is hoped may be a "first instalment" towards a return to pre-war size and contents. The war years called simultaneously for new and highly specialized ideas of "service" and for "salesmanship in reverse." To-day the Industry is faced with new problems of future ownership and administration, but never before have its opportunities been greater in those directions with which *Gas Service* is more intimately concerned. During the paper famine which, in the main, coincided with the suspension of the activities of the Gas Salesmen's Circles, it was impossible to find room to refer to the Circles, many of which, however, sprang to life again last year. With the January issue happy acquaintance is resumed with several of the Circles, whose syllabuses indicate that there is much in store. On the industrial side, too, the war years were lean, for, although more gas than ever was used in industry, security reasons and, again, the paper shortage, caused a veil to be drawn over all but an infinitesimal part of that picture. Henceforth the barriers—some of them already broken down—will gradually be overcome, and the story of the part the Industry can play in the industrial and commercial fields will be unfolded. Four years ago the popular pocket magazine size was substituted for the old quarto page, and in 1944, reflecting the trend from "salesmanship" to "service," the title was changed from *Gas Salesman* to *Gas Service*. We look forward hopefully to further relaxations in paper control in order that the service side of the Industry may have its fair share of publicity, and service personnel generally a wider and larger fund of current news and technical information.

Foremanship

A handy digest of information on good supervision, written primarily for the Gas Industry, but equally useful to the foremen, supervisors, and inspectors of all public utilities, has just been published from the "JOURNAL" offices under the title of "Notes on Foremanship." It sums up succinctly the qualities needed in those who have it in their power to make or mar the reputation of their undertakings in the mind of the consumer. The price is 1s. 6d. per copy; 12 copies for 15s.; 100 copies for £5, post free. Copies are now on sale at the "JOURNAL" offices, 11, Bolt Court, Fleet Street, E.C. 4.

Personal

Dr. R. E. SLADE, Research Controller of Imperial Chemical Industries, Ltd., has retired from the service of the Company.

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Mr. W. MALCOLM, Manager of the Auchtermuchty Gas Company, has been appointed Manager of the Duns Gas Company, Berwickshire. He went from Oban to Auchtermuchty seven years ago.

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After 50 years' service in the Gas Industry, Mr. J. COOK is retiring next month from the position of Engineer and Manager of the Fenny Stratford Station of the British Gas Light Company. His successor will be Mr. W. J. MULLEY, of the Holywell and Flint Station of the same Company.

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In a by-election to fill three vacancies on the Sudbury (Suffolk) Town Council caused by one retirement and two elevations to the aldermanic bench, Mr. C. E. GRIMWOOD, Managing Director of the Sudbury Gas and Coke Company, was one of the three successful candidates out of eight.

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Mr. A. P. ALLEN, Engineer and General Manager of the Scarborough Gas Company, has retired. He entered the service of the Company in 1904, and was appointed Manager in 1914.

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Mr. HENRY WOODALL, Chairman and Managing Director of the Tottenham and District Gas Company, has resigned from the office of Managing Director, but retains his seat on the Board as Chairman. Col. H. C. SMITH, C.B.E., D.L., and Lt.-Col. E. C. WOODALL, O.B.E., have been appointed Managing Directors. Col. Smith entered the service of the Company in 1920, was appointed Chief Engineer in 1922, and General Manager in 1943. Lt.-Col. Woodall was called to the Bar in 1922, was elected to the Board in 1931, and served throughout the war with the British Army. Mr. WILLIAM HAWKYARD has been appointed Chief Engineer. He entered the service of the Company in 1927, and was appointed Deputy Engineer last year.

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The retirement is announced from the Board of I.C.I. Ltd. of Lt.-Col. G. P. POLLITT, D.S.O. Distinguished as soldier, research chemist and farmer, he is best known as the creator of the great chemical works at Billingham-on-Tees. In 1920 Col. Pollitt became Chairman of the new enterprise launched by Brunner Mond at Billingham, where he and his men completed the construction of the first synthetic nitrogen plant in the British Empire. From 1926 to 1934 he served as Executive Director on the Board of I.C.I., and in 1939 he resumed his executive duties with that firm, joining the Special Weapons Department. He is at present in Southern Rhodesia, where he is examining the possibilities of putting into operation the theories regarding artificial drying of crops which he has long practised in England.

Obituary

Mr. H. S. MUNNINGS, of Messrs. A. G. Sutherland, Ltd., died on Jan. 17, after a short illness. He had been associated with the Company as Director for 27 years.

Tar Distillation

[A "Gas Journal" Abstract]

Mr. Roland Scott presented a Paper on Jan. 16 to the Midland Section of the Institute of Fuel on "Some Aspects of Tar Distillation." The importance of the tar industry as a source of raw materials for the chemical industry was pointed out, but a warning was given against comparing it with the petroleum industry. There is nothing n the tar industry to compare with the vast quantities of petroleum with which the latter industry has to deal. Tar is produced in small quantities at scattered points. Moreover, types of tar vary widely according to the carbonizing process in which they are a by-product—coke ovens, horizontal retorts, vertical retorts, low temperature, water-gas and some producer gas tars. Generally "the aromatic content of tars varies as the temperature under which the retorts operate, so that coke-oven tar is mainly aromatic, whilst low temperature tar contains large proportions of paraffins."

Methods of distillation, by the pot-still and by continuous tube-still, are described, together with the processes for after-treatment of the primary distillates. The Holley-Mott plant for the extraction of tar acids and bases is described with a diagram. "The acids usually recovered are phenol, cresols and some of the higher acids, such as xylenols." Separation is obtained by the use of caustic soda. The process is described with a simplified flow diagram. The treatment of crude benzole by the Barbet process is briefly referred to.

Corrosion, due to the presence of inorganic chlorides and other (some acid) compounds in tars, presents a considerable problem in design and maintenance. The removal of water and associated chlorides reduces corrosion very considerably. The point that is of interest to the gas engineer is that "the main stabilizing agent in the emulsions found in crude tar was the finely divided solid particles which are present in the tar as it leaves the gas-works." Water content is generally 5 to 7%, but may rise to 25% if the solid particle content rises. Investigations are proceeding, but in the meantime stainless steel and special cast-irons are being used to resist corrosion.

Mr. Scott concluded with a plea for further research, and particularly for collaboration between the industry, the D.S.I.R., and the Universities. Data is still lacking upon which design can be based. "It is still necessary to spend much time on the determination o physical constants before any calculating can be done. . . . There are problems in plenty. The great needs of the moment are, a settled industrial outlook to enable forward planning to be undertaken, research accommodation, apparatus and research workers, particularly the latter, so as to get on with the job."

Scottish Juniors' Brains Trust

The third ordinary meeting of the Scottish Junior Gas Association (Western District) was held on Jan. 12, at the Royal Technical College, Glasgow, and was in the form of a Brains Trust.

Mr. D. Fulton, Engineer and Manager, Helensburgh, was the Question-Master, and the members of the forum were: Messrs. J. Greig, Glasgow; E. G. Smith, Dunfermline; W. Kirk, Motherwell; A. Shand, Falkirk; and J. Fulton, Dumbarton.

The President welcomed about 40 members, and after the routine business, Mr. Fulton asked the questions and ably summed up the answers of the forum. On several of the questions there was a divergence of opinion, and a successful and instructive meeting took place.

In conclusion Mr. McFadyen moved a vote of thanks and Mr. Fulton replied.

Heat Transfer Data

At a recent meeting in London of the Institute of Fuel, Dr. Margaret Fishenden and O. A. Saunders presented a Paper entitled "Some Simplified Heat Transfer Data." It was concerned with waste heat recovery.

The Paper concentrated on presenting some of the basic data in more easily usable forms, so that the practical designer's already difficult task should not be further hampered by unnecessary detail. Actual heat transfer coefficients, which can be read off directly from curves, have therefore been worked out for some of the most important cases.

In presenting experimental data, especially of heat transfer by convection, it is now customary to economize in variables by grouping them together in arrangements known as dimensionless numbers, or dimensionless groups. A dimensionless number is the ratio of two like quantities, for example, a velocity to a velocity, a force to a force, or an energy to an energy, which determines the behaviour of any given system, whether mechanical, physical, or of any other nature. The practical value of dimensionless numbers in such problems as convection lies in the fact that a study of the fundamental processes involved enables one, even before doing any experiments, to predict the dimensionless numbers—that is, the ratios of certain pairs of energies, or forces or diffusivities, &c., by which the problem is likely to be determined. Since the dimensionless numbers are usually much fewer than their constituent variables, experimental work is reduced by their use, and the presentation of the results is simplified.

Modern Homes

An entirely new design in gas kitchens will be one of the features of the Modern Homes Exhibition at the Dorland Hall, London, which opens on Mar. 26. Sponsored by the Women's Gas Council, this new kitchen has been specially designed for the exhibition by Mrs. Darcey Braddell.

It is designed so that a mother of a young family can spend her whole day in one room, and yet do her cooking, have family meals, keep an eye on her children, and do her household work in comfort. The kitchen has a nursery recess divided by an expandable gate from the main room. All the kitchen equipment is arranged on one wall for working convenience. Cupboards and fitments are in standard sizes and include many new and useful fillings. It is an entirely gas-run kitchen for cooking, water heating, and washing and other ancillaries. Gas operated household appliances will also be shown by the Ministry of Supply. They will include cookers, fires, wash boilers and auxiliary water heaters.

Other features of this exhibition, which is organized by the *Daily Herald*, will be a Ministry of Health stand, a flat in one room, the latest in utility furniture and fabrics, a special lighting feature, pottery and glass, and an exhibit showing the layout of the new L.C.C. estate at Loughton.

Diary

Feb. 1.—Chemical Engineering Group and Institution of Chemical Engineers: Joint Meeting, Royal Technical College, Glasgow, 7.15 p.m. "Preparation of Clean Coal for Special Purposes," Dr. E. T. Wilkins.

Feb. 6.—Institute of Fuel: Paper, "Utilization of Waste Heat in Metallurgical Furnaces," E. C. Evans, Institution of Mechanical Engineers, S.W.1, 6 p.m.

Feb. 7.—Midland Junior Gas Association: "Six Years of Production Problems, Investigations, and Results," A. E. West, Birmingham Gas Department, 6.30 p.m.

Feb. 8.—London and Southern District Junior Gas Association: "Further Distribution at Tottenham," E. O. Rose, Gas Industry House, 7 p.m.

Feb. 9.—Scottish Junior Gas Association: Joint Meeting of Eastern and Western Districts, Royal Technical College, Glasgow. Paper by Dr. Harold Hartley, Junior Vice-President, Institution of Gas Engineers, 3 p.m.

Feb. 12.—British Gas Council: Gas Industry House, 2.15 p.m.

Feb. 12.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.

Feb. 13.—B.G.C. Domestic Development Committee: Gas Industry House, 10.30 a.m.

Feb. 18.—London and Counties Coke Association: Finance Commitee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m. Gas Industry House.

Feb. 19.—Chemical Engineering Group and Institution of Chemical Engineers: Joint Meeting, Burlington House, 5.30 p.m. "Preparation of Clean Coal for Special Purposes," Dr. E. T. Wilkins.

Feb. 21.—Solid Smokeless Fuels Federation: Executive Committee, 11.30 a.m. Grosvenor House, Park Lane.

"Decarbonizing" Equipment

A Potterton installation, in the works of a famous battery manufacturer, for use by operatives handling powdered carbon. The water for wash fountains, and showers, with sprays at shoulder height to avoid wetting the hair, is thermostatically controlled at 100°F. The Potterton D Series "Rex" boiler with an output of 123 gallons per hour raised 80°F. coupled to a 200 gallon insulated storage tank deals adequately with the inevitable peak load when work ceases.

F.B.I. and Financial Policy

In a statement on national financial policy which it has submitted to the Chancellor of the Exchequer, the Federation of British Industries says the announcements of the Government about their policy for nationalizing branches of Industry have a direct bearing upon national fiscal policy. It becomes imperative that if the financial results of nationalized enterprises are to be intelligently appreciated they must be separated from the general Budget, and be drawn up on a commercial basis in accordance with accepted accounting principles. They should be reported on by independent qualified auditors and should be published. Nationalized industries should provide their fair contribution to the national finances. Unless this principle is adopted, the sections of industry left under private ownership and the general taxpayer will be called upon to bear a greatly increased burden of taxation.

Non-productive expenditure should be reduced. The Federation is convinced that in addition to automatic reductions there is room for further economies, and urges a strenuous effort to secure that non-productive expenditure does not continue longer than is strictly necessary. Both the Excess Profits Tax and the National Defence Contribution should be abolished and no new tax should be devised, but in the field of direct taxation reliance should be placed on income tax. This is the fairest method of raising revenue from profits, and will avoid the necessity of further complicating the tax structure with yet another impost with its own rules and regulations.

Reports on German Industry

As announced in the "JOURNAL" last week, reports submitted by teams of industrial experts who have visited Germany under the auspices of the Combined Intelligence Objectives Sub-Committee and the British Intelligence Objectives Sub-Committee for the collection of scientific and technical intelligence from German industry are now being made available for publication. Among such reports so far published are:

CIOS XXIV—6. Steinkohlen-Bergwerk Rheinpreussen Moers-Meerbeck: Synthetic Fuel Production, 13s.; post free 13s. 4d.

CIOS XXV—7. Plant of Klocknerwercke A.G. Castrop-Rauxel: Synthetic Fuel Production, 1s. 6d.; post free 1s. 7d.

CIOS XXVII—68. Fischer Tropsch Unit Leipzig Gas-Works, 1s.; post free 1s. 1d.

CIOS XXVII—82. Fischer Tropsch and Allied Processes, 2s.; post free 2s. 2d.

Copies may be ordered from the Sales Offices of H.M. Stationery Office at York House, Kingsway, London, W.C.2; 13a, Castle Street, Edinburgh, 2; 39/41, King Street, Manchester, 2; 1, St. Andrew's Crescent, Cardiff; and 80, Chichester Street, Belfast, at the prices indicated.

Most of the relevant reports are in the Library of the Institution of Gas Engineers, and may be consulted there upon application to the Secretary.

Conference on Industry and Research

A two-day Conference on Industry and Research which, under the auspices of the Federation of British Industries, will be held at the Kingsway Hall, London, on Mar. 27 and 28, will give a notable opportunity for representatives of organized industry and those who, in this country, are leading and directing industrial research, to meet and discuss their common problems. The Conference will take as its leading subject the application of science by industry, and the part that research is playing, and can play, in promoting industrial efficiency, exports, full employment and a higher standard of living. The Conference will be divided into four sessions, as follows:

Session 1. Science, Industry and the Community. Speakers: Sir William Larke, Sir Edward Appleton, F.R.S., Sir Harold Hartley, F.R.S., and Sir Ernest Simon.

Session 2. Scientific Research and Production. Papers: "Research and Quality"; Dr. J. R. Hosking, Director of Research and Development, Paints Division, I.C.I., Ltd. "Research and Production Costs"; Mr. A. Healey, Director of Production, Dunlop & Co., Ltd. "Conversion of Research into Production"; Dr. C. C. Paterson, F.R.S., Head of the Research Laboratories, General Electric Co., Ltd.

Session 3. Scientific Research and Industrial Expansion. Papers: "How New Industries Arise"; Dr. R. E. Slade, lately Research Controller, I.C.I., Ltd. "Modernization of Processes and Plant"; Mr. C. H. Davy, Chief Research Engineer, Babcock & Wilcox, Ltd. "The Part Co-operative Research Can Play"; Mr. A. J. Philpot, Director of the Scientific Instrument Research Association.

Session 4. The Application of Research in Industry. Papers, "The Firm with a Research Department"; Dr. P. Dunsheath, President of the Institution of Electrical Engineers. "The Firm without a Research Department"; Sir Raymond Streat, Chairman of the Cotton Board.

Careers in the Gas Industry

To explain to those about to leave school the possible careers open to them in the Gas Industry was the principal object of the Wandsworth and District Gas Company in inviting senior schoolboys to a tour of the works on Jan. 10. About 40 boys were present, and every effort was made not only to show them how the apparatus functioned, but also to explain the qualifications necessary for gas-works personnel and their prospects.

Following their inspection of the works the boys were entertained to lunch in the board room. In welcoming them Col. C. M. Croft, President of the Institution of Gas Engineers, said that representatives were present from every branch of the Industry to answer questions. Whether a boy wished to become an engineer, a chemist, a physicist, an electrician, a salesman, or desired to enter any other branch of the Industry, here was his opportunity to obtain first-hand information and advice upon his chosen subject.

He made particular reference to the impending nationalization of the Industry, and wished to reassure parents who hesitated to encourage a boy to enter the Gas Industry lest his chances were jeopardized. Nationalization was again referred to in the general questions which followed. Asked how gas was likely to fare in competition with electricity for domestic purposes, Col. Croft said that, although the superiority of electricity was unquestionable for such purposes as lighting, he thought that when nationalization came into force it would be necessary to use whichever fuel was the most economical, and here the need for gas would be greater than ever. A questioner who asked whether nationalization would tend to stifle the development of "sidelines" was given an emphatic "yes." In answer to a question on call-up for military service Col. Croft said that chances of deferment were slight. Although the labour authorities had been generous during the war, scientists were now getting "the wrong end of the stick."

Schools represented at the visit included Oundle, Marlborough, Charterhouse, Bedford, St. Paul's, Berkhampsted, Monkton Combe, and King's College, Wimbledon.

Big Extensions at Birmingham

Birmingham City Council has approved a report of the Gas Committee recommending extensive developments of the gas plant at Nechells.

The position became acute last winter, when the output of gas for the seven days from Jan. 23 to 29 reached the record of 533,928,000 cu.ft. the report said. Actual production during these seven days when the whole of the plant was working at full pressure was: coal gas, 408,017,000; water gas, 122,065,000 cu.ft. The deficit of 3,846,000 cu.ft. was made good from gas stored in the holders. Had the demand continued longer at this record rate, the consequences would have been grave.

Certain plant at Nechells Works has been in commission for 40 years, and some sections, such as purifiers and coke screens, have become obsolete and will have to be renewed.

The intention is forthwith to build an installation of vertical retorts having a daily capacity of 4,000,000 cu.ft., and when the existing horizontal retorts (capable of producing 2,000,000 cu.ft. daily) are dismantled, probably several years hence, it is intended to install a further range of vertical retorts with a daily capacity of 4,000,000 cu.ft. Tenders for the initial installation have been obtained, and—subject to the approval of the Ministry of Fuel and Power—that of West's Gas Improvement Co., Ltd., amounting to £218,969, has been accepted.

The reconstruction and extension of ancillary plant will also involve heavy expenditure, and tenders have so far been accepted from W. C. Holmes & Co., Ltd., for tower purifiers, £197,160; Parsons & Morrin Ltd., for purifier crane track and foundations, £13,625; Fraser and Chalmers Engineering Works, for coke screening plant, £81,853; W. Hamilton & Co., Ltd., for coke screen structure, £32,000; C. & W. Walker, Ltd., for tar extractor and gas condensers, £7,154; and Lodge Cottrell, Ltd., for tar precipitation plant, £5,670.

In addition provision has to be made for a dust extraction plant in connexion with the discharge of coke under the retorts, extended railway facilities, electrical equipment, foundations, connexions between components, messroom accommodation, all of which it is estimated will cost £82,050. The total cost of the scheme, which in its preliminary stages received the approval in principle of the Ministry, is computed to amount to £638,481, excluding the second installation of vertical retorts. It is calculated that, with the exception of the railway sidings, the work will take two years to complete, but it is hoped that if the scheme is sanctioned promptly by the Government the vertical retort installation will be ready for gas making at the beginning of the winter of 1947–8.

RETORT HOUSE TECHNICAL CONTROL

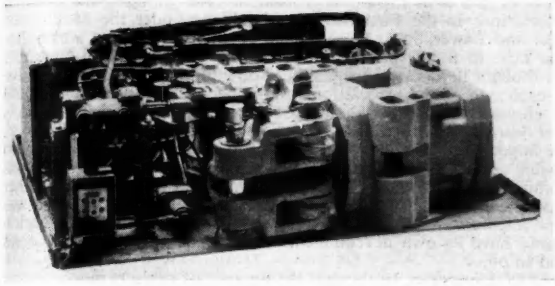
Early application should be made to the "JOURNAL" Offices, 11, Bolt Court, Fleet Street, E.C.4, for the new book on "Retort House Technical Control" by A. R. Myhill. "Very soon it is to be hoped," wrote our reviewer, "that in every continuous vertical retort operator's pocket will be found a dog-eared copy of this excellent little book." The price is 12s. 6d., post free.

Hydraulic Drive for Rotary Grate

A hydraulic drive has been developed and standardized for the operation of the rotary grate. This takes the form of an entirely self-contained unit, and is extremely compact. It affords an infinite speed range, under control by a single knob which can be taken up to the control room.

This Lockheed hydraulic drive unit, primarily designed for the operation of rotary grates, can be utilized for any similar application where controllable, slow, intermittent movement is required, and can be imparted by a pawl lever engaging a ratcher wheel, rack or endless chain.

The frequency with which the intermittent movements take place can be varied almost infinitely, and the stroke of the operating cylinder, and thus of the pawl lever, can be regulated to suit different requirements, its range being from 1 in. to 4¾ in. at the pawl. In addition, the time taken for the power stroke can be changed to suit particular applications by varying the pump speed (this necessitating the supply of a non-standard electric motor and pump). The direction of imparted movement is reversible by virtue of the cylinder mounting.

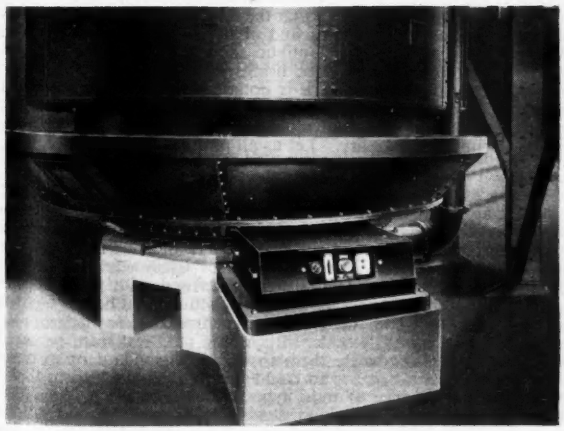


The control unit with casing removed.

Maximum continuous working pawl efforts are 5.3 and 8.2 tons; to overcome extreme cases of clinkering, &c., however, this effort can be increased by 50% temporarily, to give a breakaway. The other benefit with this equipment is that there is no necessity for the incorporation of shear pins, &c., as the working pressure can be predetermined and set, and any overloads are dealt with by means of the relief valve, with the ability, as stated, of temporarily increasing the maximum effort for continuous working by 50%. The whole unit is extremely neat and compact, and a metal cover boxes in the installation completely, all sub-units and piping being contained within the casing.

The stop-start switch for the motor driven pump, knurled speed control knob, and the fluid level gauge are mounted accessibly on a panel, integral with the unit.

Subdued lighting is provided for this control panel, the lamps being wired in circuit with the pump motor, so that the fascia is illuminated when the unit is running. The adjustment for the stroke is reached by removing the cover, which is detached, after slacking back the knurled screws provided, without disturbing the installation of the unit in any way.



The neat, self-contained unit incorporating the hydraulic operation of the rotary grate, showing the illuminated control panel.

Installation is a simple matter, and the units are designed for fixing down to a bed plate by means of ½ in. and 1 in. bolts in elongated holes to provide adjustment. The only connexion requiring to be made is that for the electricity supply for driving the pump motor.

Adjustment is provided in the mounting of the cylinder and pawl lever portion of the unit to allow for any wear that may take place in the bearings or guides of the driven wheel or rack; this allows the pawl to be lowered by up to ½ in. The hydraulic circuit is self-bleeding—thus requiring no attention—and a Purolator filter is fitted, which may be cleaned without dismantling by the rotation of the handle provided. Wick lubricators are fitted and the bearings are sealed against oil loss. Bleeder screws are provided so that the completeness of the self-bleeding may be checked.

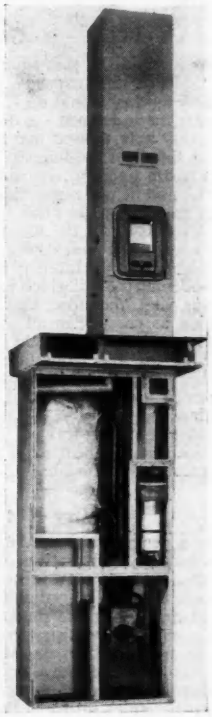
The whole design and construction incorporates hard chromium plated wearing surfaces, heavy duty seals and such other precautions as will guarantee a long life with the minimum of attention and maintenance.

Advantages of this system are: (1) Ability to stall without damage and therefore no necessity for shear pins; (2) pawl thrust adjustable up to the given maximum (continuous working); (3) adjustment to increase thrust 50% for emergency "breakaway"; (4) visible and infinitely variable speed control; (5) reduced manufacturing cost of grate as teeth can be flame cut; (6) extreme ease of installation owing to unit construction and lack of need for accurate alignment; and (7) high efficiency due to the inherent characteristic of hydraulics to permit big movement ratios with small losses.

Complete Heat Service Unit

The necessity for building and equipping houses rapidly due to the pressing needs of war and post-war conditions has resulted in increased attention being paid to the manufacture and installation of complete heating units. Not only must these units be capable of furnishing maximum heat at a reasonable cost, but they must also be easily manufactured, transported, and erected. During recent months several models have been designed, and have been used with success on experimental housing sites.

Such a unit, designed for the Ministry of Works by the Atplar Committee for use in a 900 sq.ft. house, is being manufactured by the Pyrene Company, Ltd. It can be used with either a back-to-back grate and cooking oven with a boiler incorporated or with a closed fire with a back boiler. An additional choice is provided with a grate and back boiler. Made in three pieces, the framework is constructed of light angle-iron, and measures 1 ft. 9 in. by 3 ft. 6 in. on the ground floor and 1 ft. 9 in. square on the first floor. Following the usual pattern of such appliances, this unit is provided with a single duct extending the full height of the house which carries the 8 in. diameter cast-iron flue for the main solid-fuel appliance, the cold water feed, and all other vents and pipes.



View of complete heat service with panelling of ground floor sections removed.

Provision is made for the fitting of a gas water circulator for use in summer when the fire is not in operation, and a gas fire can be installed in the recess provided in the upper portion for the bedroom.

The 30-gall. copper storage cylinder is indirectly heated by the back boiler in the solid fuel appliance, and directly by the gas circulator or immersion heater. In addition to the hot water pipes to kitchen and bathroom, connexions are provided to the 12½ sq.ft. radiator in the drying cupboard, the linen cupboard coil, and to the towel rail. Using all the heat for the hot water supply, it was found that 3 hours after lighting the open fire 25 gall. of water at 140°F. were drawn off. Should the hot water supply exceed the domestic requirements, it can, if necessary, be directed to the drying cupboard or linen coil.

Arrangements are made for two fresh air inlet ducts. In the first the air is warmed by passing round the solid fuel appliance, and can be regulated into either the two bedrooms or into the dining recess. The other has its outlet near the solid fuel appliance. It has been found by testing that the bedrooms thus provided can be maintained at a temperature 10°–15°F. above the atmosphere temperature.

Recent tests using an open fire and back boiler show the following hourly figures. Of a total heat make of 31,270 B.Th.U., the dining recess receives 470 B.Th.U., the living room 6,600 B.Th.U., the two bedrooms 800 B.Th.U., water 10,300 B.Th.U., and 2,200 B.Th.U. was radiated from the unit. Tests with an openable stove and back boiler with closed doors show that of a total heat make of 27,300 B.Th.U., the dining recess receives an increase of 1,570 B.Th.U., and the bedrooms 31 B.Th.U. upon the above figures. Radiated heat from the appliance is increased by 930 B.Th.U., but the water loses some 2,300 B.Th.U., and the living room 1,500 B.Th.U.

Future of the Gas Industry

Dr. E. W. Smith's Views on the Heyworth Report

"WHAT of the Future?" was the title of an Address by Dr. E. W. Smith, C.B.E., to members of the Midland Junior Gas Association at Birmingham on Jan. 8. There was a large attendance of members. The President (Mr. K. L. Pearce, Bilston) occupied the chair.

Dr. Smith said that subject to a few reservations the Gas Industry would always tick over and be reasonably successful in spite of itself. The war had shown that the public required gas and coke. Both could be supplied, but the future of the Industry depended on the extent to which it gave the best service that was practicably attainable, and at the lowest practicable price. He believed that the very make-up of the Industry over the last decades had been such that it had not encouraged the public in getting both those things. That was understandable, although he did not mean to say that there was no individual place that had given good service at the best price. Before they could judge as to what were the defects they had to know the history of the Industry. They had to remember they had a guaranteed price, and they could not make a loss unless there was something radically wrong over a short period. They were guaranteed as far as shareholders were concerned, and replacement of loss by the rates under municipal control. Some 60% of gas was produced by companies and 40% by local authorities. The companies had to raise capital and pay interest and were not allowed to wipe it out, but local authorities' undertakings could pay back by enhanced price to consumers.

Good in Parts

None could say that small undertakings, however well run within the limits of their capacity, could give the service or produce gas as cheaply as they would do if they were differently organized. Consequently, he welcomed the decision of the Heyworth Report in so far as it very ably showed that regionalization and integration were vital to the future of the Industry, but like most reports drawn by persons who had a nodding acquaintance with an Industry it was "good in parts," and he was not satisfied with many of the details of the report. They must not assume that the report necessarily would in detail bear any likeness to the Bill which would be put forward eventually by the Ministry of Fuel and Power. He thought the Ministry would depend very largely on the Industry to assist, by their arguments and demands, in modelling the Bill which was to come before the House of Commons. It was vital, therefore, that there should be as much informed discussion as possible in all sections of the Industry, in order that the maximum assistance might be given to the Minister and his staff in devising the best conditions under which regionalization shall be applied when the Bill becomes an Act. That required very well-informed leadership, and it was to be hoped that those who were leading the Industry to-day would show a maximum amount of courage in putting forward demands for assurances, and give detailed consideration of the mass of regulations that would have to be brought in before it was too late.

Why Not a National Board?

As a general criticism he asked why it was necessary to treat the Gas Industry differently from other industries that were going to be handled. There were to be ten independent regions, but why had a National Board co-ordinating all the regions been cut out? One could only feel there must be some desire on the part of the Gas Division of the Ministry to take a more active share in the direction of the Industry than the Minister had indicated to be his intention to allow them. If they had ten or twelve regional boards, each independent, they would not overlap in regard to gas, but there were other directions in which they might become competitive, in regard, for instance, to the demand for various classes of coal and in relation to coke. There was need for the Industry to be a national entity and not ten different entities.

He felt very strongly that it was essential there should be a National Gas Board, as in other industries, and that there should be a complete interchange of personnel and technique.

The future of the Industry depended, in his view, more on the Junior Gas Associations and their members than on any other single factor; They were the men who in the years to come would have to run the Industry, and the extent to which it was successful would depend on their keenness and their ability, so they needed a Director of Education for the Industry, not just for chemists or engineers, but for all specialized personnel, including accountants and administrators.

The most important item which he considered required national co-ordination was the subject of research and technical development. He was one of those who felt that research associations should keep strictly to research, and when he said research, he did not mean development. He thought that when a particular piece of research had reached a certain stage in which full-scale work could be tried out that work should be developed by others rather than the Research Associations. One of the advantages of regionalization would be that technical work, whether engineering or chemical, would be co-ordinated within the regions, and there would be development centres which would not be confined purely to the development of the use of gas.

Development for Different Processes

There would be development for different processes of interest to the Gas Industry. At present there were four or five research associations in the fuel industry, and it was inevitable that at an early stage in discussions the question would arise as to whether these associations should continue to be responsible in future to the Department of Scientific and Industrial Research. He thought the research associations in the Fuel Industry should be under the Ministry of Fuel and Power, and have a similar relationship to that which they had now to the Department of Scientific and Industrial Research. He thought it was vital there should be unlimited scope for initiative in each one of the associations, the unnecessary overlapping should be eliminated, and that there should be encouragement on subjects that were common to two bodies for joint committees and work. He hoped each Region would have a fully organized research organization which would be co-ordinated with the national body that was within the Gas Industry as distinct from co-ordination with other industries, and that they would stick strictly to their *last*—that was real research work, not development work—and that each region would have its own development centre to deal with new processes and so on.

As to universities, he thought the number of subjects in which their research departments specialized should be extended. University lecturers should be encouraged to maintain their own individuality, and put forward their own suggestions for research work. There should be no interference with the prosecution of research, but when a particular job which had been relegated to a university had gone on for a sufficient time, in the opinion of the people finding the finance, they should have the opportunity of reviewing the position. He also suggested that when a piece of work was given to a professor and handed to a research worker there should be a guarantee that the work would continue for a specific period. Too often work was handed to an assistant, and when a great deal of work had been done he took another job, the work was left high and dry and much time wasted.

Dr. Smith deplored the practice of using research workers as consultants. These men had a whole-time job to do, and the technical work of the Industry could be done by development centres. He advocated the appointment of a Director of Education linked up nationally with the Board of Education, responsible to the National Gas Board and to act as a liaison officer with the Ministry. He would be associated with those directing education schemes, and they would have a proper national welfare and training scheme. There ought to be classes for every type of worker, and he was certain that with the right leadership and encouragement they could get wonderful results as the result of a sympathetic education scheme for artisans.

"I believe," said Dr. Smith, "that the future of the Industry depends almost solely on the keenness and ability of the individuals in it. We have to realize we are a public service. I really believe that 99 times out of 100 good work brings its own reward, and under proper management good work is noted; the results are noted and progress is inevitable if the individual pulls his weight and does his best. The future of the individual should not depend on seniority but on keenness and ability. Let us all pull our weight."

DISCUSSION

Mr. **J. Foxton** (Cheltenham) said that when a young man started in life he looked round for a career which would give him a reasonable amount of contentment and a decent salary, and one thing the Gas Industry did not offer was a decent salary. Every week in the Press they saw fairly responsible positions advertised with small salaries offered. Contentment in a job was a great thing, and he had enjoyed it. Consistently good work was sometimes acknowledged, but rewarded on a niggardly scale. Regarding technical men, he asked were they going to educate them to a degree standard or to make them good, practical men who could do the jobs assigned to them? Having had experience of most types of men, he often found that the man who had jogged along steadily in a practical way was the more realiable worker than the degree man. Could Dr. Smith say that the Industry was prepared to offer reasonable salaries for men of the right type?

Dr. **Smith** agreed that salaries were low, but on the other hand the Industry did not need too big a proportion of highly trained degree workers. What they wanted to ensure was that men were doing the jobs which they understood. He cited a case where at a fairly large works the management was prepared to pay a much larger salary for the right man when the old engineer resigned, and there was no difficulty in obtaining a further advance on the suggested sum. He

was quite certain that the companies, at any rate, could do that kind of thing; but when it came to municipal undertakings the question of other officials' salaries was taken into account.

Back Door Mentality

Dr. H. **Hartley** (Vice-President of the Institution of Gas Engineers) reminded the meeting that integration had been recommended in the Gas Industry's Planning Report. Their scheme was somewhat different from that of the Heyworth Committee, and he could not imagine that either scheme would of necessity be adopted in its entirety, especially in regard to the areas constituting the separate regions. This was a matter for careful consideration by those competent to advise, and he had no doubt the Minister of Fuel would take steps to see that he was fully informed on all relevant points.

Integration would give larger units with greater resources. It would be possible to do much more in the way of service for the consumer, and to provide more first-class men for the staffs of the undertakings. It was a fact that the representatives of the Industry who most frequently made contact with the householder had a "back-door mentality." The representative of the electrical industry generally called at the front door and expected to interview the householder in the lounge, but the gasfitter, who had often to act as the ambassador of the undertaking, went to the back door prepared to discuss his problems in the kitchen.

His (Dr. Hartley's) own interests were in the domestic field, and he was especially conscious of the importance of good consumer contact. It was necessary that the representatives should understand the purpose for which gas was supplied, and what it was expected should be done with it. With integration there should be much better opportunities for the young men in the Industry and, as Dr. Smith had said, the future rested with the young men. Very often the older men tended to become conservative with the passage of years, and were often afraid to take a chance. They should allow the young men to go ahead. This attitude of mind ought to apply when any major decisions were taken with regard to the loads which the Industry would seek. In the future more would have to be done with water heating and domestic space heating, as the cooking load was bound to shrink. On the subject of research he was far from satisfied. The Industry did a great deal of *ad hoc* research, but neither the Industry nor the Universities were really getting to the root of things. Fundamental research must be pressed forward, especially in the combustion field, which concerned the Gas Industry probably more than any other of our industries. In the future steps must be taken to ensure that combustion research would advance as knowledge had advanced in the domain of physics. As to Research Associations, he was very much at one with Dr. Smith on the question of the kind of work which should be done by them. He felt, however, it would not be possible to make a hard and fast rule. Personal experience in the last few years in connexion with one Research Association had made it clear that it was extremely difficult to be successful in developing appliances. On the other hand, there might be a case for development work being undertaken by a Research Association if heavy expenditure were involved, and the Lord President of the Council had suggested that the Government might make *ad hoc* grants for such purposes, contributing £1 for every £2 expended by the Research Association. Dr. Smith's remarks had proved very stimulating, and he felt sure there would be a good discussion.

Value of Integration

Dr. **Smith** defined what he meant by larger units. He did not conceive that integration was necessarily going to involve the closing down of any big proportion of the smaller undertakings and their concentration into larger units, entailing the distribution of gas and coke over long distances. He did not think there would be any justification for carrying gas long distances any more than there was to-day, and he considered that where there were towns and villages which could be adequately catered for by putting up or continuing small gas-works, it was all to the good. The value of integration was not so much in big units, as in the fact that small units would have placed at their disposal all the services of the bigger units of the Region; whether it be in repairs, in coking, engineering problems, accountancy assistance and the collection of accounts, or other things which would be made available to the different districts to aid their production and render them more efficient. That was the real value of integration, making the facilities of the big units of the region available to the smaller undertakings. The work of development, as distinct from research, should be carried out by separate organizations; by a comprehensive organization of Research Associations, but known as Development Associations or Development Centres, where any technical work for the Region could be carried out, and where any large scale work could be financed by the Industry as a whole at any suitable place; not necessarily in one centre, but at suitable works. On Dr. Hartley's last point he had much sympathy with Research Directors. In most Research Associations they had been skimped for funds which could not be maintained and were inadequate; so much so that even Research Directors had been obliged to spend too much time in cultivating popularity, by playing up to types of work in order to satisfy their voluntary subscribers. It ought not to be necessary, but this was the actual result of what he would call the failure of voluntary integration.

Mr. **I. F. Millar** (Dudley) said that in regard to an education scheme it could be quite competently covered by the manager and staff of small works; but if there was going to be nationalization and integration, it seemed to him that it would be a great advantage if the Gas Industry could in co-operation with allied industries provide courses for chemical engineers, mechanical and gas engineers and accountants. When they came to medium and large size works, some of the problems were not particularly confined to the Gas Industry by any means. There were particular problems—condensation, for example, which was a matter for the chemical engineer—and as these engineers would be in touch with similar people in other industries, they would be far more competent to deal with the job than one confined to the Gas Industry itself, which was bound to be somewhat narrow and limited. He suggested that it would be wise to contact other industries, particularly those dealing with fuel, with a view to technical colleges providing more courses, and specialists to concentrate on matters which were of interest to all technicians.

A Serious Omission

Dr. **Smith** entirely agreed, and mentioned that the Institute of Fuel education scheme ran along those lines. There were various courses which were open to the mechanical engineer, the chemical engineer, the gas engineer, the oil engineer, the coal engineer and the like—courses available to all those industries—and by proper selection of the different classes or courses they could obtain the particular type of instruction wanted. It should not be something specialized in the course for engineers, but something common, but they would require a Director of Education to see that this was done. He had omitted to mention that one of the criticisms he had to make of the Heyworth Report was in connexion with the Big Six that were to be selected to run the proposed Regions. There was one serious omission, for there should surely be a Technical Director. There was mentioned a straight engineer, an accountant and a sales manager; but unless they had someone who was personally responsible for directing the technical side and who would be the scientific adviser available to all other services, he was certain from his experience that technical direction would be on a very low level.

Mr. **S. Brockbank** (Walsall) said it seemed to him that the Gas Industry was suffering from outside causes which had tended to give the public an idea that there were faults in it, but for which the Industry was not itself responsible. They had recently read of troubles not directly the fault of the Industry, but due to the lack of foresight of Government departments during the war years. The result was that the Industry had come under much public notice, and it had been decided that something must be done quickly, but his view was that unless they were careful the Industry would be pushed into something which might not be for its benefit. Reading the Heyworth Report, his chief criticism was not that the units were going to be too large or too many, but rather that they could have done with some of them not so large. While it might be necessary to make the Regions cover such a wide area, he would like to point out that many important industries were being successfully carried on in much smaller units. He thought that co-ordination could easily be done by local linking up without the necessity of going to the length of nationalization. Did Dr. Smith think they were being pushed into nationalization, not for the direct benefit of the Industry, but possibly for other reasons, amounting to a retrograde step?

Dr. **Smith** replied that he thought nationalization was the wrong word to use. He did not think they could secure integration of any kind unless the units integrated had a common financial ground. The Government to-day and Mr. Heyworth had apparently seen that issue, and their idea was that there should not be a nationalized body like the Post Office, in which Civil Servants ran everything, but rather that there should be a Board like the London Passenger Transport Board and the Port of London Authority, in which certain people were put in charge, and in order to eliminate all the problems of adjustments in financial matters, there was to be a common finance. He thought that the question of finance was quite secondary, because no matter who were the people who were going to run the Industry, the main idea of getting a common finance was to eliminate all the various adjustments which were necessary between one undertaking and another when integration was tried. The great point was, who was going to run the Industry?

Frustration and Finance

Mr. **Goodland** (Birmingham) said many people who had any kind of technical training could walk round a works and point out all sorts of things which would bring about an improvement, but they had great difficulty in arranging any satisfactory financial basis, because under the present system of financing industry managements had to consider a return sufficient to pay interest on the money required, or at any rate incur no less. That meant that the amount of finance made available depended on the capacity of the undertaking in question either to accumulate sufficient reserves, or to borrow money in order to do this work; and it seemed to him that this question would need first or immediate attention in any scheme of integration, regional or national. Given this, then they could carry on development work, and so give a great deal of encouragement to many people who had

taken up small but satisfactory pieces of research which could not be developed. He knew of people who found great difficulty and frustration because development work on a full scale at a going concern could not be taken up where the research people left off, solely because the work could not be financed. He hoped that one result of integration would be the removal of this difficulty and frustration, and he suggested that there would also be integration of commercial policy which would be of benefit to consumers, in one respect as affecting the sales of appliances.

Alluding to education, Mr. Goodland discounted the idea that by accumulating a certain number of certificates a young man could immediately be advanced to a very high salary. His contention was that it was not so much the possession of certificates, however excellent they might be, but the fact of taking a course of education and doing and understanding the work involved—which might perhaps lead to a certificate—which fitted a young fellow for a good position, and an enthusiastic student who was really keen on the profession and set about to equip himself with knowledge of the Industry should find no difficulty in obtaining a good job.

Dr. **Smith** agreed that whether men had certificates or not, what the Industry wanted from them was to deliver the goods. In going round some 200 works in the early part of the war, he found that there was not the slightest difficulty in getting workmen to take a thorough interest in any matter connected with furnace work, so long as it was explained to them in simple language. They would respond readily, and rise to every proposal put before them. He had not the slightest doubt that if they would develop something which had not been attempted so far in the Gas Industry—the art of administration—they would go a long way. "Our greatest defect to-day is the lack of administrative ability, combined with the problem of psychological understanding," added Dr. Smith.

Mr. **T. F. E. Rhead** (Birmingham) said the first essential of education was to train character, then to inculcate good health, and on top of that to train the mind as far as possible. He endorsed the view that it was vital to have a Technical Director to whom the Big Six could look for the best technical advice, and it was a serious omission in the Heyworth Report. He also agreed that education for the Gas Industry itself was too narrow a field for technicians. He would prefer a man to have an all-round education in some particular science, and then add to it some technology like fuel, and so forth. It would give him the satisfaction of knowing that he had not necessarily got to stick to one particular industry, and here he would made a plea for flexibility in the interchange of technicians between various industries.

"Quite Good"

Mr. **G. K. Hawthorn** (Birmingham) urged that it was important for them in the next few weeks or months to say what they thought about the Heyworth Report and regionalization generally, otherwise the people who spoke for them would not know what the Industry really felt. He agreed with Dr. Smith that the Heyworth Report was quite a good one, and with a regionalization scheme in general. He also disagreed as to the test of a region being individual competition and isolation; that obviously would not do at all. Surely it was possible to have regional schemes which were properly co-ordinated, which indeed was what the Industry must aim at. Perhaps Dr. Smith could enlighten them whether the Government was likely to endorse the Heyworth Scheme, but personally he did not think so. He rather thought the Government would allow individuals in competition, and the Regions to work in competition locally; and if the Industry had to be co-ordinated by the Ministry, he believed they would have nothing to fear on the score of individualism.

Dr. **Smith** believed the intention of the Government was that the financing of development work could be done by the Industry, possibly with some assistance from the Government. The reservation of 1d. per therm allocated to development work for the whole Region would bring in an enormous sun, but that amount would be unnecessary. For any special purpose programme requiring a great deal of time special provision might need to be made, but normally development could be financed within the Industry and done through the Development Centres. Another point was that among those who were carrying out research work of a fundamental nature, there was always a big proportion who desired to enter into industry. They were the people who would be available for coming into industry with research experience and carry on development work. Development officers should come largely from those who had done research work in Research Associations. He strongly endorsed the view that persistence was needed if the Industry was to gain a favourable response from the Ministry to any justifiable demands that were made. It was only by persistent hammering that they were likely to get what they wanted. To make representations by a formal letter and leave it at that was not the way to succeed.

Practical Application of Knowledge

Mr. **A. B. Britton** (President, Midland Association of Gas Engineers and Managers) said he was a little surprised that the discussion had centred around technical and scientific education rather than the practical application of that scientific and technical knowledge. He agreed with Mr. Goodland when he said certificates were not everything. They in the Industry all came across many men with bundles of certificates, but lots of them were of little use, and had no real interest in applying their knowledge to the Industry, while even if they did have that idea, they just did not know how to do it. They wanted very practical men in the Industry, and while he agreed that scientific and technical education was essential, the question of how they were going to effect their contact on the practical side was another matter. He welcomed Dr. Smith's remarks on hammering at the Ministry; the need for it he could support from experience. But as Dr. Smith had said, they must see that their proposals were sound to start with.

Dr. **Smith** considered that too much had been left to chance in the selection of juniors. What he hoped to see as part of their industrial organization was that in every Area a man's abilities should be studied, helped and developed in the right direction. If he was a practical man he should be given a chance in jobs which he could do well, and allowed to advance and progress in that direction. He had a good deal of experience in the control of young men, and it was extraordinary what could be done by selection, and by the humane contacts which aimed at guiding them in what they should do.

The Industrial Centres

Mr. **H. R. Hems** said he gathered from the discussion that it would be a good thing if annually or every other year they had "a shake-up" on this question of high policy, particularly if the lead in opening the discussion was of the standard which Dr. Smith had put before them. He was pleased to hear Dr. Smith and other speakers allude to the combination of research and development. He considered that the two could work together, and as had been said, it was necessary that there should be the right type of Director for development. Mr. Hems referred to the Industrial Centres as a practical example of Development which had been working for a number of years, and he was satisfied that they had reached a definite stage in their own development, which must be very greatly extended to render sufficient aid either as they were now, or under the new aegis. He thought they could not go very much further unless finance was extended very considerably, because at present all their development work was done with an eye to the rate that was to pay for it at the end. They had criticized the Heyworth Report, and that report criticized the Industry, not without some ground, inasmuch as they had not studied sales or market research to the extent they should have done, and the report pointed out very strongly the potential future sales in the Industry.

Dr. **Smith** remarked that the Heyworth Report was a great advance on anything the Industry had previously had presented to it. He had only been critical in order to be helpful, and to make things better and more practicable. The brilliant way in which the Heyworth Committee worked up to their inevitable conclusion that the Industry would have to be regionalized, and to be regionalized would need to have a common finance, was something they did not often get from Committees of this kind.

No Need for Heart-Burning

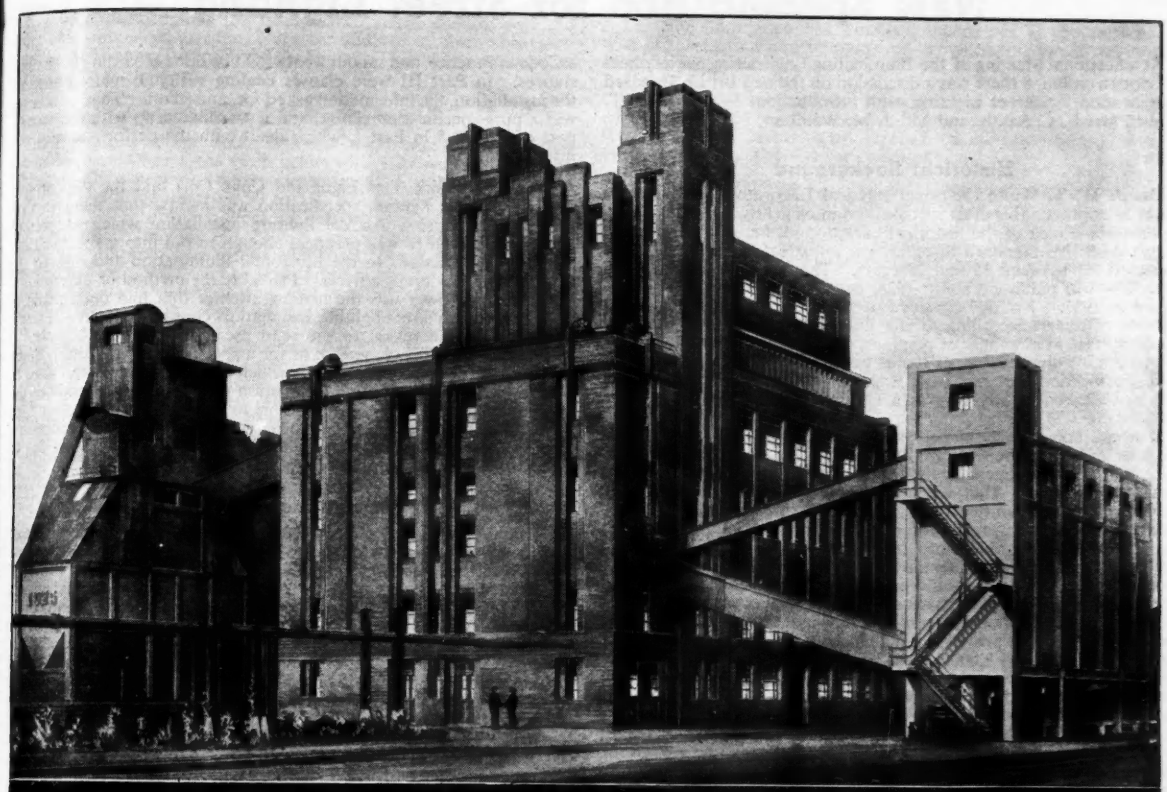
Dr. **Smith** replied that a lot of small undertakings supplying cheap gas did so because they were not giving the service required. The Board set up would accept things as they found them. They would make a survey and would not shut down the small works for the sake of doing so, but would judge each on its merits in relation to the gas supply of the Region as a whole, and to the best advantage. One could not say what principle they would adopt, but they would view the matter as a business proposition, which was the only way to deal with it. There need not be any heart-burnings, because competent men, technical and practical men, would have plenty of jobs to do.

Mr. **Alfred Hill** (Senior Vice-President) proposed a vote of thanks to Dr. Smith. Mr. **S. Brockbank** (Junior Vice-President) seconded.

In acknowledgment Dr. **Smith** said that seeing the vitality evinced in the discussion one could have no fear and no doubt of the future of the Gas Industry.

Burntisland Shipbuilding Co., Ltd., have launched the S.S. Chessington, a self-trimming collier, which has been built for the Wandsworth & District Gas Company. As the vessel left the ways she was christened by Mrs. Cyril M. Croft, wife of the Director and General Manager of Wandsworth & District Gas Company.

The Home Office (Fire Service Department) has recently published Part 6B of its *Manual of Firemanship*. This volume contains a Chapter 41, entitled "Town and Other Gas and Fires in Gas Undertakings," which was prepared in consultation with the Chairman (Mr. F. M. Birks) of the Gas-Works Safety Rules Committee of the Institution of Gas Engineers. The book also includes chapters on Fires in Oil Installations and Tank Farms, Electricity and the Fire Service, Fires in Rural Areas and Fires in Crashed Aircraft. Copies are obtainable from H.M. Stationery Office (price 2s. 6d. net).



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New Specification for Street Lighting

At a Sessional Meeting of the Illuminating Engineering Society held in London on Jan. 8 there was a discussion on the new British Standard Specification for Street Lighting, with introductions by Dr. J. W. T. Walsh, Mr. F. C. Smith, and Mr. J. M. Waldram.

Historical Background

Dr. J. W. T. Walsh (National Physical Laboratory) said that in order to approach this draft specification intelligently it was necessary to have some idea of the historical background, because the attempt to get a British Standard Specification for street lighting had been going on for between 15 and 20 years. The original specification—No. 307—was published about 1928, and the current draft was published in 1931. No. 307 classified street lighting installations into a number of classes according to the illumination received on a horizontal surface at a number of points in each span of the installation—the test point illumination, as it was called. It was clearly stated in that specification that this basis was for classification only, and was not to be taken in any way as a criterion of the excellence of an installation.

It would be generally agreed that that specification did very good work in improving the standard of street lighting in the years between then and the appointment by the Ministry of Transport of the Departmental Committee. That was the next step in the history of the subject. That Committee reported in 1937, and it threw over any attempt to classify installations by any sort of illumination figure. In brief, it divided roads into two main classes—viz., main traffic routes or Class A, and residential and side streets, or Class B—and it recommended that there should be a very definite and noticeable gap between the two classes of roads so far as lighting was concerned.

The draft specification was confined to Class A roads, and it recommended that the light provided should lie between very widely different figures, viz. 3,000 and 8,000 lumens per 100 ft. run. That was a very wide range, and was frankly stated simply to give an idea as to the amount of light which it was expected the sources would provide, and having no direct relation whatever to the illumination to be expected at any particular point in the installation.

There was one very important recommendation in the Report of the Departmental Committee which was the whole *raison d'être* of the draft specification, and it read as follows (Paragraph 117 of the Report) : "The recommendations which we (the Committee) have made in this Report are not intended to serve as a specification. In our view they should be implemented with the minimum delay by the issue of a formal specification by the British Standards Institution." That was a clear call to the B.S.I., to prepare a new specification on the lines of the Departmental Committee's Report. Therefore the Committee of the B.S.I. dealing with street lighting got busy, and decided that perhaps the best way and the most practical way would be to have a small sub-committee to deal with the various details which should be included in a new street lighting specification. That Sub-Committee contained representatives of all who were regarded as being interested in street lighting. They were making a fair amount of progress when the war broke out, and all work of that kind simply went into cold storage.

However, a good deal of ground clearing had been done. They had considered, for instance, whether it was desirable to re-introduce or stick to the illumination at a particular test point as one of the criteria for the excellence of street lighting. The Sub-Committee considered horizontal illumination, vertical illumination and illumination at all sorts of points in all sorts of arrangements.

Specification or Code of Practice?

A little over a year ago the Sub-Committee was asked to get together again, and they were able to take up things more or less as they had been left, and to proceed on the lines which appeared so promising in 1939. However, before the Sub-Committee got busy again, the main B.S.I. Committee took stock of the position to see if the intervening years had produced any marked change of attitude as regards the desire for a specification in particular. There had been a certain amount of discussion between those who said that a specification was not a practicable thing in the case of street lighting, and that the thing which would be most useful would be a code of practice.

On the other hand, there was very strong pressure from the consumer side especially to have a definite specification which would form the basis of competitive tenders. Thus it was difficult, if not impossible, to reconcile these two points of view. The Main Committee, which was rather a large one, debated this issue at considerable length before instructing the drafting Sub-Committee to proceed with its work. Ultimately, the decision, arrived at by quite a large majority, was in favour of drafting a specification, and that was the instruction to the drafting Sub-Committee.

The draft specification was divided into three parts. Part I was couched in mandatory language, and it always said "shall." It dealt with such things as mounting heights, spacing, overhang, &c., and Clause 5 of that Part I dealt with the effect obtained from the lanterns on the road. Part II, on the other hand, was considerably more like a Code of Practice, and set out what might be done according to circumstances. In Part III were clauses dealing with the maintenance of the installation, the information asked for, and so on. That, of course, was a pure specification clause, and it was linked up with the second part of Clause 5 in Part I, which dealt with the performance of the installation.

Mr. F. C. Smith (Gas Light and Coke Co.) said the difficulty in drafting a street lighting specification was mainly that there was no means of appraising a street lighting installation which at present commended itself or was practical enough to put into a specification. There were objections to the horizontal illumination and also to the vertical illumination as criteria. Probably the method of determining the revealing power was the nearest attempt that had been made to state how truly a street lighting installation could be effective in terms of what it would reveal to the road user. It was not, however, a practical method for commerce or for a specification, and it fell down also because certain of the factors which determined the excellence or otherwise of a street lighting installation were not in the hands of the lighting engineer. It was not possible to make a man responsible for factors over which he had little or no control, in terms of a specification. That, therefore, was the main difficulty that anybody who started to draft a specification would encounter.

Acceptance Number

Turning to Clause 5 of Part I, he said the second part of it dealt with a mystic number which had made its appearance for the first time—viz., the acceptance number. Perhaps it would be better if he stated what this was not. It was not a criterion of the excellence of a street lighting installation. It was not a number—linear or in any other type of scale—which related excellence to a numerical value. It was what was known in engineering practice as a "go or not go gauge." Either it was a "go" gauge or a "not go" gauge, but it did not indicate how far it failed or how excellent the achievement was. The acceptance number was measured on the street by measuring the vertical illumination at about one metre height on the same side of the road as the adjacent lamp. At present this acceptance number was restricted to installations on straight roads with staggered formation, and this was referred to as Type 1. The feature of Type 1 was that the candle-power distribution at these high angles to the vertical should be such as to permit of a high road brightness and, in the main, to ensure vision by silhouette. The vertical illumination thus measured was multiplied by the square of the horizontal distance of the first lamp, and in this way a figure was obtained which was called the acceptance number.

He personally found it somewhat difficult to say there was a logical basis for this mystic number, but it might be well to indicate what had influenced the Sub-Committee in this matter. After the Departmental Committee's Report was published, quite a number of installations came into being, and it was possible, before the war, to judge whether they succeeded or not in giving tolerable street lighting conditions. It would be agreed that many of these installations were, as far as the art of street lighting was understood at that time, splendid examples, although they necessarily had defects. Therefore, if we knew from examples of that kind the vertical illumination that was obtained measured in that way—and bearing in mind that vertical illumination was, after all, the criterion of the candle power at these critical angles for that type of installation—it should be possible to view the acceptance number as giving an indication as to whether the installation as a whole was reasonably satisfactory.

Use and Abuse

A great deal of criticism had been directed at the original B.S. street lighting specification which specified horizontal illumination, but this criticism was very unfair because it became the practice to try to obtain the minimum horizontal illumination, and to ignore very conveniently all the other factors which were insisted upon in the specification. That was an abuse and not a use of the specification. In the same way, if the acceptance number was taken alone, that would be an abuse of the draft specification. It would be an improper use, and any criticism arising out of an improper use of the specification was, in his view, quite unjustified.

Dealing with the factors which the lighting engineer had under his control, Mr. Smith said the mounting height could be controlled, and so could the spacing distances, within limits, because they were influenced by practical considerations. The lighting engineer could also control the type of arrangement, and he could ensure that the lumen output of the lanterns fell within the requirements of the specification. The specification outlined three types of distribution. Coupled with these matters under his control, the lighting engineer could consider the recommendations in the Appendices, which were a guide to good practice. Thus it was possible to arrive at the acceptance number, which was a figure and nothing more. If one installation had an acceptance number twice that of another, it would be entirely wrong to say that that particular installation was twice as good.

Passing to the maintenance clause, he said that had been extremely difficult to draft because both illuminants had their own particular characteristics which influenced maintenance conditions. Therefore, it had been decided that the maintenance clause should state the order of maintenance that the contractor undertook, always provided it did not fall below 50% of the initial figure. That left room for some individuality at all events.

Achievement of Stability

The question would no doubt be asked how it was ascertained that the maintenance figure has been achieved. That was arrived at in this way: The acceptance number was measured after the installation had been operating for from 50 to 150 hours. The reason for that delay was fairly obvious, because certain sources had particular characteristics. They did not settle down before that period, and this period was allowed in order to enable the installations to achieve some degree of stability. The acceptance number might be large in some cases but, whatever it was, that number was regarded as the basis for maintenance. Then all that was necessary was that from time to time the acceptance number should be measured to determine the depreciation, always remembering that 50% depreciation of light output did not mean a 50% depreciation in revealing power.

Mr. **J. M. Waldram** (General Electric Co.) explained that the Sub-Committee had devised a test which if it did not test visibility directly, ensured that if it were passed, one would be fairly sure of a good installation. It enabled the different characteristics of the two sources to be allowed for. In the case of gas, there was a good deal of adjustment in order to obtain the desired result, but in the case of electrical sources this was not so.

The Sub-Committee had confined themselves to the non-cut-off type of installation and to staggered arrangement, but it was hoped to go further.

Dr. **S. English** suggested that the acceptance number had all the bad features of the old test point, and it did not even have the good feature that it measured something on the road. It did not measure anything on the road at all and was very indefinite.

Mr. **J. M. Waldram** said the Sub-Committee was aware of the difficulty due to small scale maps, which had been mentioned. He differed completely from those who said the specification was likely to stultify progress. Lighting engineers would not be restricted to any particular type of lantern or any particular arrangement of lamps in the lantern, either horizontally or vertically. Neither were they restricted to any particular type of illuminant. He believed it would be found that any decent street lighting distribution would pass the test easily. The references to high uniform background lighting in the Departmental Committee's Report had been misunderstood. The difference between a Code of Practice and a specification had been the subject of considerable debate, but the members of the Sub-Committee had to get on with the job irrespective of their personal feelings. Sometimes the nature of the job decided the point, and whether eventually there would be a Code of Practice depended as much as anything on the nature of the job.

Purging of Gasholders

By N. G. MATHER, B.Mech.E., A.S.T.C., A.M.I.Mech.E.,

Construction Engineer, the Australian Gas Light Company, Sydney

THE purging of gasholders is only carried out infrequently, even by the largest gas undertakings. Because of the disastrous consequences which would follow from the ignition or detonation of a holder while it was being incorrectly purged, it is considered essential that the operation should be supervized by someone who has had previous actual experience of purging holders.

Gas undertakings who have not experienced persons on their own staff should make arrangements for the loan of such suitable persons from the staffs of other undertakings. The purging should not be done hurriedly, and the proposed programme should be committed to paper beforehand. All appliances, fittings, and valves to be used should be checked prior to use. Once a purging operation is started it should be preferably continued to completion.

There are four separate cases to be considered:

(1) Holders being placed out of commission—
  (*a*) Purging by means of air.
  (*b*) Purging by means of inert gas, followed by air.
(2) Holders being placed into commission—
  (*a*) Purging by means of gas.
  (*b*) Purging by means of inert gas, followed by gas.

It is considered that the operation of placing a holder out of commission is much more difficult than that of placing a holder into commission. While both cases require all care and consideration possible, there is the unknown factor, in the former case, of the internal conditions which exist. Under no circumstances should the inner lift of a holder which is being placed out of commission be landed on the rest blocks, prior to the purge being completed.

(1) *Holders being Placed Out of Commission.*

Preliminary Work.—Having made sure* that there are no oils floating on the surface of the water inside the holder, it should be deflated to a low level, but not landed. Allowance should be made for the contraction possible during a cold night. The inlet and outlet valves should be shut and tested for leakage. (*Note.*—All gas valves should be two-faced, with a test plug in the body between the two paddles.)

The horizontal sections of the gas inlet and outlet dip pipes should now be flooded with water, the depth of which should be sufficient to seal the holder against the pressure of the inner lift. This may be checked by dropping a rod on a cord down the outer leg of the dip pipe. Steps should also be taken *physically* to isolate the holder from the works gas mains. This can best be done by taking out a section of main between the top of the dip pipes and the inlet and outlet valves, or by inserting a blank flange steel plate on to the holder side of the gas valves.

A connexion should now be made from a suitable air-blowing unit (preferably steam driven), and from a source of inert gas, to the top of either the inlet or outlet dip pipes. Cut-off valves which are shut should be available on both the air and inert gas connexions. The particular dip pipe can now be pumped out and unsealed. A previous inspection should have been made of the plate and valve covering the vent hole at the top of the holder crown. If a full-bore valve is not available in position at this point, it is preferable to place one in position (shut) before the holder is deflated. This can be done under full gas pressure provided necessary precautions are taken against the possibility of workmen being gassed, and also provided the cover plate is held to the crown by either set screws or studs. It is considered that all holders should have been equipped with a suitable vent valve or cock at the top of the crown before they were initially placed in commission. Having the vent valve in position, a light gauge vent pipe, about 6 ft. high, should be fixed to the top flange of the valve.

If the holder is in such a position on the works that there is some risk of ignition of the gas which will be passing up this vent, an alternative is to place a suitable tee-piece on the top of the vent valve and run a light gauge pipe down the crown of the holder, thence up one of the columns of the guide framing, with a flexible hose connexion between the lower end of the piping on the crown and that passing up the column. It should not be forgotten to make provision for the easy removal of condensate from the lowest point of this piping system.

Having prepared the holder ready for purging, a check should be made of all apparatus and valves to see that they are in working order. This is preferably carried out the day before the purging is done. If apparatus is used for making inert gas, it should be actually operated and all running conditions checked against a similar pressure to that thrown by the inner lift of the holder, the inert gas generated being passed out to atmosphere through a branch valve which is adjusted to give the actual operating pressure.

A full-speed running test, under full load, should be carried out on the air blower. A branch pipe, with valve, delivering to atmosphere is convenient for this purpose.

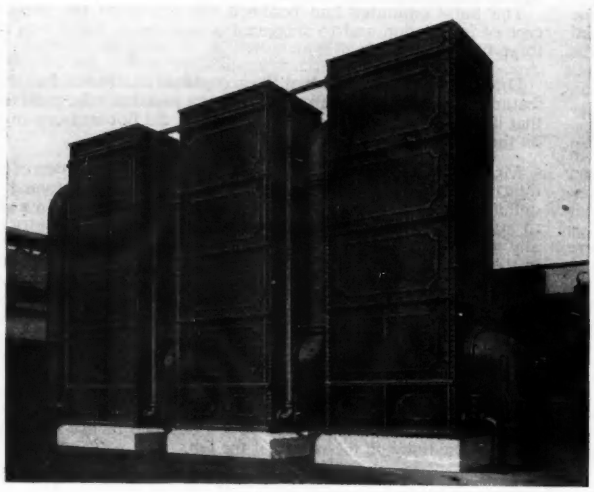
Those who are to carry out the purging should be personally warned to provide themselves with rubber-soled footwear, and that they should not carry matches, as there is an extended period during which practically pure gas will issue from the venting system.

Air Not Recommended

(a) *Purging by Means of Air.*—In spite of the fact that it has been common practice for many years, the Author is of the opinion that the method of purging a holder being placed out of commission with air should not be used.

Besides the possibility of floating oils being present inside the holder, the corrosion products on the inside of the crown sheeting are in a chemically reduced condition and may oxidize rapidly on exposure to an air supply, thus generating sufficient heat to start ignition or detonation. Further, the time required to pass through the explosion range while blowing air into coal gas is much more protracted than the reverse case. A typical explosion range for coal

* See procedure recommended by the American Gas Association's Booklet, *Purging of Gasholders.*



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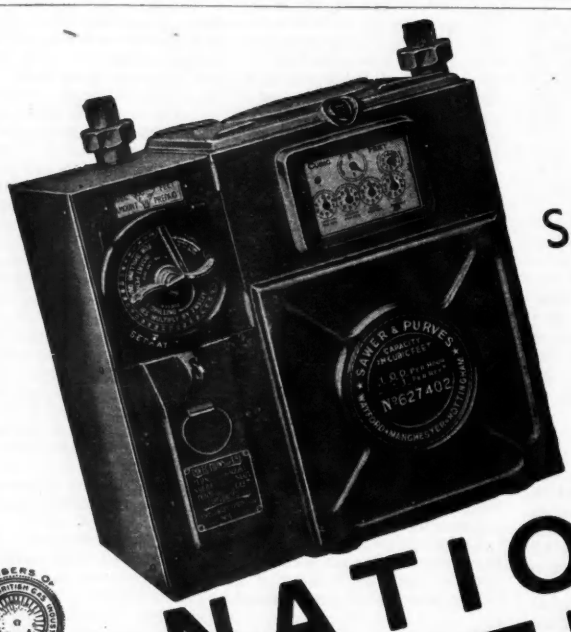

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gas, taken from *Technical Data on Fuels*, by H. M. Spiers, p. 241, gives:

Lower limit (by volume) in air . .	5.3%
Higher „ „ „ . .	31.0%

These percentages vary, of course, with the composition of the inflammable gas to be purged. For the example given, it would be necessary to have blown air into the holder until there was approximately twice as much air as gas before the upper limit of explosion was reached. Explosive conditions would then have continued for an extended period until there remained less than 5.3% of gas in the crown. It is principally because of the above-mentioned factors that purging a holder being placed out of commission should not be done with air.

(b) *Purging by Means of Inert Gas.*—The preliminary requirement of this method of purging a holder being placed out of commission is an adequate, reliable, and continuous supply of inert gas.

A comprehensive Paper on this subject was presented to a meeting of The Institution of Gas Engineers on Nov. 3, 1937, by F. M. Birks, then Deputy Chief Engineer of the Gas Light and Coke Company. The source of inert gas recommended was from the controlled combustion of suitably cooled town gas. The inert gas machine mentioned evolved by C. A. Harrison, of the Brooklyn Union Gas Company (U.S.A.), is fully described in the Paper.

In considering a method of obtaining a suitable supply of inert gas for a holder recently placed out of commission at the Mortlake Works, it was finally decided to adopt a pressure head type of burner using a 4-in. supply of coal gas. It is believed that the burner used is the largest of its kind yet made in Australia, and was designed by the staff of the Australian Gas Light Company to consume up to 4,000 cu.ft./hour. The products of combustion were suitably cooled by direct contact with cold water sprays in a vertical tower and passed forward through a safety water seal. It was found necessary to construct the safety seal with 100 1-in. diameter dip pipes attached to a circular distribution chamber. This type of safety seal also had the added advantage of acting as a further cooler for the hot inert gas.

In order to cool the inert gas down to a suitable temperature (in practice this was approximately 90°F. maximum at inlet to holder) a large quantity of water was required. This was supplied by a positive type pump capable of delivering up to 5,000 gallons per hour against a total operating pressure of 25 lb./sq.in. The water was passed through one of two $\frac{1}{16}$-in. mesh strainers arranged in parallel, so that either could be shut off and cleaned while the plant was running.

The water was delivered through 14 pressure sprays located at the top of the cooling tower. These sprays were specially designed to give an almost parallel discharge. Gas was supplied through a 4-in. delivery from a source of constant supply capable of throwing a pressure of 16-in. water gauge, although this pressure is not required at the burner. The air from the blowers passes from the orifice through the throat of a venturi tube and draws the gas in by the usual injector effect.

The combustion chamber of the burner, which was approximately 2 ft. 3 in. long, was lined with Thermofrax refractory material. The burner was directly attached to the side of the cooling tower at the bottom, and its entry to the tower was protected by a small hood. The air blowers used were two "Weston" 3 h.p. units each rated to deliver 190 cu.ft. per minute at 28 in. W.G. pressure. They were driven by two G.E. 3-phase, 3 h.p. induction motors (Type AK.926) running at 2,900 r.p.m. At a point 12½ in. from the venturi throat, the burner was provided with a 1-in. diameter ignition hole fitted with a 1-in. gate valve. The cooling tower, which was 3 ft. diameter by 19 ft. 6 in. high, was provided with a detachable head holding the cooling water spray pipes, and also with observation windows opposite the sprays. These windows were only used for test runs on the sprays, and were considered unsafe for use during running.

A washer safety seal was provided with inlet and outlet pressure gauges and a source of make-up water through a sealed inlet feed. A sealed overflow pipe ensured that a constant level was maintained in the sealing chamber. An adjustable overflow and gauge were also provided to enable the depth of seal to be altered if thought advisable. The object of the safety seal, interposed between the burner and the holder, was to prevent any gas coming back from the holder to the burner, which, of course, contains red-hot refractory brickwork when operating. It would be possible for either the air supply from the blowers or the gas supply to the burner to fail while purging was being carried out.

Just before a control valve, near the point of entry to the holder, the inert gas supply line was provided with a relief branch valve to atmosphere. On the holder side of this valve a branch pipe (with its own cut-off valve) was connected to a large-capacity electric blower for the air purge, which follows the inert gas purge. This blower was a No. 8 Sturtevant unit running at 1,490 r.p.m.

Inert Gas Operations

Operations when Purging with Inert Gas.—A cool, cloudy day, with wind blowing, is preferable to carry out operations, but not essential. Having tested the apparatus for generating inert gas, the holder is prepared by being deflated to a low level (with sufficient margin to allow for any possible contraction during a very cold night, which might land the inner lift). The horizontal sections of the inlet and outlet main dip pipes should be sealed with water, and then physically isolated from the inlet and outlet gas mains by taking out or blanking off a section of these mains between the holder dip pipe and the main holder gas valves. A branch connexion is also conveniently made when doing this, at the top of either gas main dip pipe, for the introduction of the inert gas.

Having made these preparations and made sure that the blow-off valve at the top of the holder crown is workable, and also having made provision to lead the gas from this point through a flexible connexion at the edge of the crown well up one of the guide columns, the particular gas main dip pipe to be used for purging may be unsealed. First make sure that the control valve from the purging unit is shut. This will bring gas pressure back from the holder to this valve. The purging unit is now started up and adjusted for running at approximately holder pressure through the branch relief valve. Satisfactory checks having been made on its composition and temperature, purging may be commenced.

(*Note.*—It is considered good practice that the temperature should not be greater than 90°F., and the composition at least 10.5% CO_2, with a CO content of not more than 0.5%.*)

The branch relief valve is now cautiously shut while at the same time the control valve to the holder is opened. Pressure gauges should be provided at convenient points to make sure that pressure conditions remain steady throughout the whole system while this is being done. If the inert gas apparatus is located some distance from the holder, as it should be for the sake of safety, it will be found convenient to install a field telephone from the control valves near the holder to a point near the inert gas apparatus. This apparatus should be controlled by a separate attendant.

The blow-off valve on the top of the holder crown is now opened and adjusted so that the holder remains in a steady position while the purging is proceeding. The purging should now be continued until the gas issuing from the vent is a mixture of one part of town gas with at least ten parts of inert gas. This is stated by F. M. Birks to be at a time when the CO_2 content of the escaping gas is at least 91% of the sum of the mean CO_2 content of the purging gas, on an air-free basis) and one-tenth of the CO_2 content of the gas originally in the holder†—*e.g.*, if the purging gas and the gas originally in the holder contain 10.5% and 3% CO_2 respectively, the purging should be continued until the CO_2 content of the escaping gas equals—

$$\frac{91}{100}\left(10.5 + \frac{3}{10}\right) = 9.8\%.$$

It will be found that practically pure gas will issue from the crown vent for a considerable period due to the high gravity of the inert gas. This is approximately double that of coal gas. Before the inert gas purge is finally stopped, a check sample of the escaping gases should be collected and tested for ignition through a bunsen burner. Having completed the inert gas purge, the control valve from the inert gas source is shut, and a final purge is carried out with air from a blower connected into the purging main (with its own control valve) between the inert gas control valve and the holder dip pipe.

To carry out this air purge the holder may be 50% inflated with air and then lowered fairly rapidly by swinging the curb vent plates around on one of their studs. This procedure enables them to be easily shut prior to the holder landing, which should be carried out gently by regulation through the vent valve at the top of the crown. Having landed the holder, the manholes should be removed and the water pumped out of the annulus before anyone is permitted to enter it. When the annulus is empty, the bell should by then be unsealed throughout its circumference, thus giving a draught through to the inside and rendering it safe for entry and internal examination.

A visual check should be made to be sure that the holder is properly unsealed at the bottom, as there is always the possibility of an accumulation of silt and debris at the bottom of the annulus.

It is again emphasized that a holder should always be purged with the inner lift floating.

As a matter of interest, the quantity of inert gas required for purging will probably be at least twice that of the gas in the holder at the commencement of operations.

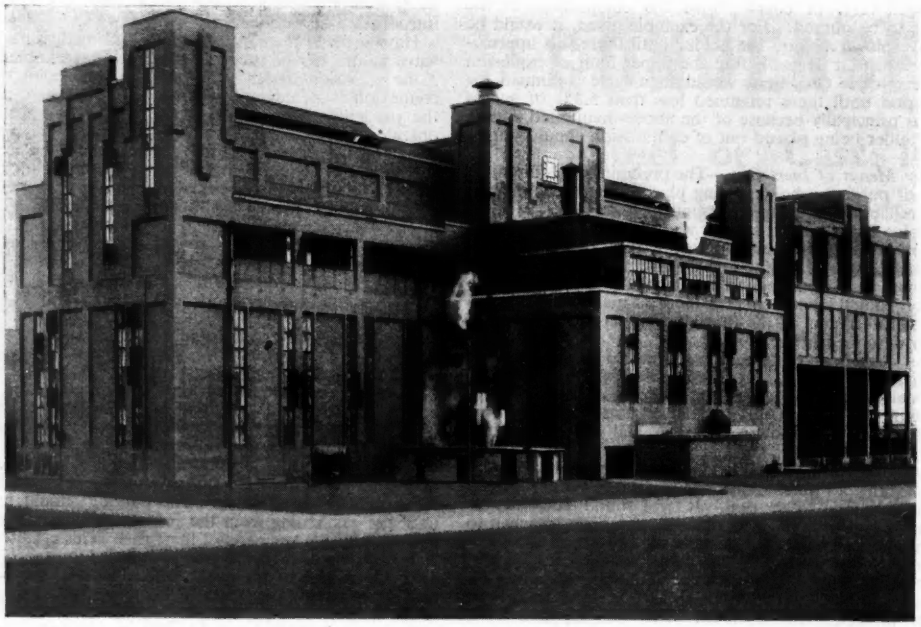
Back into Commission

(2) *Holders being Placed Into Commission.*

(a) *Purging by Means of Gas.*—After a holder has been built or repaired, it must be purged of air before it is placed into active commission. The simplest method, and one which has been the usual practice for many years, is to purge with gas from the same source as that which is to be eventually stored in the holder. As previously stated, a purging operation is one which should be carried out under the direction of someone with previous actual purging experience, and should be done deliberately and to a programme previously determined in writing and checked. As before, once a purge is started it should be continued to completion.

* "Purging Gasholders by Means of Inert Gas," by F. M. Birks, Gas Light and Coke Company; Paper to Institution of Gas Engineers, Nov. 3, 1937.

† The American Gas Association, on the other hand, recommends the use of combustible gas indicators calibrated against three or four mixtures of the gas being purged.



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Taking the case of a water-sealed holder which has just undergone extensive repairs, before filling the annulus with water a thorough inspection of the complete holder for freedom from foreign obstructions and the proper adjustment of the guide rollers should be carried out by a competent inspector. The quantity and variety of the debris located by such a final inspection after construction or repairs is frequently surprising. The annulus is now filled with water to overflow level. If extensive resheeting and reconditioning of rollers has been carried out while the holder has been out of commission, it should be fully inflated with air prior to making arrangements for the gas purge. During this air inflation, careful checking of the cupping and uncupping of the various lifts, pressures thrown, and of the correct functioning and clearances of the rollers should be made by the inspector. Leaving the inlet and outlet dip pipes sealed with water, the connexions of the mains from the top of the dip pipes (outside the holder) to the inlet and outlet valves which had previously been physically isolated from the holder are now remade. Assuming that the connexion from the air blower had previously been made to the top of either of these dip pipes, this is also disconnected and restored to its original condition. The holder can now be prepared for purging operations.

Due to the fact that the coal gas used for purging is to be admitted through either the inlet or the outlet dip pipes, it is to be appreciated that the gas will progressively collect at the top of the crown, and that a pool of air will lie beneath it. Provision must be made for the removal of this air. This is done by fitting the top vent with a dip pipe of a length to be just clear of water level, say 6 in., when the holder is deflated. In the case of larger holders, this dip pipe may therefore be of considerable length, and special provision may have to be made for its eventual and convenient removal at the completion of the purge. It may be constructed of light gauge iron and should provide for a short length of riser outside the holder crown, so that the escaping air and gas mixture is thrown well into the atmosphere.

An ideal dip pipe would be constructed of light gauge copper sheet, as there would be no danger of any friction sparks as the pipe is withdrawn. An iron pipe which has been greased on its outside against such sparking may prove difficult to handle. This difficulty may be overcome by using a jinny wheel tackle suspended from a rope across the guide framing from one side to the other. However, in practice the operation of removing the dip pipe is carried out in a few seconds by a couple of experienced men, provided with the usual hose type gas masks. As before, any men who will be walking on the crown should be provided with rubber sandshoes, and personally relieved of all matches and warned against smoking before starting operations.

Finally, the condition of all set screws holding down the curb vents should be checked for hand tightness, and suitable red lead jointing compound provided adjacent to all vents which have to be closed. It is also convenient to provide a large plug of plastic clay near the top crown vent, in case same should be required. The inlet and outlet gas main dip pipes are now pumped clear of the sealing water, a final check made of all essential points, and the test plugs replaced on the double-faced inlet and outlet gas valves. Purging operations are now commenced by gently opening the gas valve which is to be used, until the holder is just rising. If this is accomplished easily and without any jar, the shut-off valve on the vent pipe, which should have been shut at the start of operations, may also be gently opened and the rate of gas entry increased. The inlet gas valve is now adjusted until there is sufficient gas coming in to keep the holder bell afloat, say about 6 in. from landing, with the crown venting valve on the dip pipe full open. By check testing at regular intervals it will now be found that the escaping mixture from the vent pipe riser is practically pure air. This condition will obtain for a considerable period. To augment the rate of purging, some of the curb vents may be opened by swinging the cover plates around on one set screw, which is loosened but not removed. Each time any such alteration is made it will be necessary to alter the rate of gas entry into the holder to keep the lift floating in a steady position. A constant and accurate check should be kept on the position of the lift during the purge. When the percentage of oxygen in the escaping gases has fallen to approximately 6%, the curb vents should be finally closed with jointing material, the crown vent closed, and the holder may then be lifted fairly rapidly until it is about half full. During this period the functioning and relative positions of the radial and side guide rollers should be checked for correct clearances and proper functioning.

If the half filling of the holder involves cupping the second lift, the rate of filling should be slowed down before cupping occurs and the correct cupping carefully checked as it takes place. It is now necessary to remove the light gauge vent pipe which is hanging down inside the crown. This must be done under full gas pressure, and the men should be equipped with gas masks. The hose type of mask is quite suitable.

Experience shows that condensation on the dip vent pipe minimizes the possibility of ignition taking place through chance sparking while this is done, but nevertheless a large plug of soft clay should be kept nearby ready for use. The alternate method of greasing the outside of the dip pipe, prior to it being placed in position, is not recommended.

(b) *Purging by Means of Inert Gas followed by Gas.*—Due to the fact that inert gas has practically the same density as air, there is no separation into layers, and it is not possible to expel the air rapidly out of the crown. Birks states that inert gas to approximately 3½ times the volume of the crown will be required. Depending on the rate of input of inert gas, this might well reach a figure of four times or more for a large holder. Unless an adequate source of inert gas is available (such as the cooled waste gases from a waste-heat boiler), purging a large holder by this means may well become very protracted. Before deciding to carry out such a purge, the time factor should therefore be carefully considered.

Having carried out any necessary full inflation test with air, as before, the purging connexions from the supply of inert gas are remade as previously described, and the inert gas generator tested under a pressure the same as that thrown by the inner lift. The holder is prepared with the light vent dip pipe passing down through the crown vent valve, and a short vent pipe to atmosphere controlled by a valve. The removable sections of the inlet and outlet gas mains are replaced in position, and the inlet and outlet valves checked for gas tightness and left shut.

The inlet and outlet gas dip pipes may now be pumped out and purging commenced. The vent valve on the crown is shut before starting. The curb vents should also be shut, but need not yet be jointed. The inert gas generator is started up, discharging to atmosphere, and then gradually switched over to the holder without disturbing the pressures in the line. Experience shows that a sudden change-over with consequent pressure surges may extinguish the pressure head burner. Temperature of the inert gas and its composition should now be checked at regular intervals as it enters the holder.

The inner lift should now be floated until it is well clear of the rest blocks. The crown venting valve can then be adjusted until the holder is floating steadily in such a position that an enforced stoppage of the purging would not result in such a contraction during a cold night that the inner lift could again settle on the rest blocks. Analysis of the venting gases should now be made at regular intervals. Theoretically, the CO_2 content of the issuing gases should be raised to approximately 10%, but if in practice a figure of 9% can be attained it will be satisfactory, as the mixture of gases then remaining in the holder will only contain approximately 3% of oxygen, and the nitrogen content will approximate 87%. This mixture will not form an explosive mixture with coal gas, and will not even support combustion. The production of inert gas is now stopped, and the isolation valve on the inert gas line shut at its point of entry to the inlet gas main.

From now on the procedure is similar to that already described for purging by gas only, and the precautions taken should be the same, as the final gas issuing from the crown vent will be nearly pure coal gas.

Recommendations

Resulting from experience gained while placing holders out of and into commission, the following recommendations are made:

(1) Holders being placed out of commission for repairs should be purged by inert gas followed by an air purge.

(2) Holders being placed into commission should be purged with inert gas followed by coal gas.

(3) When first constructed, every holder should be equipped with the following:

(*a*) Suitable full-bore crown venting valve, and in the case of large holders similar valves at the curb vents.

(*b*) Removable sections of the inlet and outlet gas mains between the inlet and outlet gas valves and the dip gas pipes.

(*c*) All gas valves should be double paddle valves with a test plug between.

(*d*) A suitable branch on the inlet or outlet gas main complete with isolation valve for future purging operations.

(4) Holders should only be purged under the direction of a competent person who has had previous actual experience of the operations involved.

The Ministry of Works has agreed with the National Council of Building Material Producers and the Distributors of Builders' Supplies Joint Council a scheme for the disposal of surplus builders' materials. Materials not required by the Government will first be offered to local authorities for the housing programme. For the remainder, as supplies become available bona fide merchants and producers will be invited, by advertisement, to apply for catalogues, which will be supplied for a nominal fee, and the goods will be sold by competitive tender. The Ministry is also prepared to negotiate with manufacturers for them to purchase, in appropriate cases, the whole stock of their commodity remaining after local authority requirements have been met. The bulk of Government stocks of goods suitable for housing will, of course, be absorbed by Government Departments themselves or by local authorities, and it is not expected that large quantities of items in short supply will become available to the trade. There will, however, be large quantities of goods which, for various reasons, such as pattern or condition, are not of much use for housing as they stand or which, in view of considerations of transport, have only a local market. There will, for example, be thousands of slow combustion stoves intended for Army huts, and miles of asbestos pressure piping and glazed stoneware piping.